

REMARKS

1. Claims 1-10, 12-15, 21-24, 26-27 were rejected under 35 U.S.C. 103(a) over Lin et al. (US patent 6,127,227) in view of Wang et al. (US 2005/0110102).

Claim 1 is directed to “forming sidewall dielectric on an ONO-type ... stack” by a method using an ISSG process with an H₂:O₂ flow ratio of less than about 0.2.

Lin discloses oxide spacers 170 (Fig. 2H) on sidewalls of a “stacked gate” structure which includes “augmented ONO composite” 140 (Fig. 2F; column 5 lines 37-40 and 46-49). Lin does not explain how the spacers 170 are formed.

Wang discloses ISSG oxidation of silicon 402 and silicon nitride 426/427 (Figs. 4E, 4F). For the purposes of these Remarks, it will be assumed that Wang’s ISSG has the H₂:O₂ ratio as in the applicant’s claim 1. Moreover, it will be assumed, as stated by the examiner, that it would have been obvious to use ISSG to oxidize Lin’s stacked gate structure. A question remains, however, whether it would have been obvious to use Wang’s flow ratio in Lin. It is respectfully submitted that Wang’s oxidation is directed to a different purpose, involving different materials, than Lin’s formation of spacers 170, and hence Wang’s flow ratio would not have been obvious.

More particularly, Wang’s ISSG simultaneously oxidizes the following materials (Figs. 4E, 4F):

- silicon nitride 426/427 (used for charge storage, NOT insulation, as explained below);
- silicon 402/432.

Accordingly, Wang’s flow rate is optimized to provide similar oxidation rates for these two materials (see Wang’s paragraph 0011, last sentence, and paragraph 0022).

In contrast, Lin’s spacers 170 are formed on sidewalls of a “stacked gate” structure comprising:

- nitrogen-treated polysilicon 120, containing nitrogen 125 (column 4 lines 39-51);

- ONO's bottom oxide 143 (column 4 line 58);
- augmented N-O-Si layer 130 (column 4 lines 62-65);
- silicon nitride 133 (used for insulation);
- top oxide 135 (column 5 lines 16-18).

The examiner is respectfully noted to have provided no reason why Wang's flow rate would be successful or appropriate in oxidizing all these layers in Lin's structure.

MPEP 2143.02 states:

A rationale to support a conclusion that a claim would have been obvious is that **all the claimed elements were known** in the prior art and one skilled in the art could have combined the elements as claimed by **known methods** with **no change in their respective functions**, and the combination would have yielded nothing more than **predictable results** *KSR International Co. v. Teleflex Inc.*....

The prior art can be modified or combined ... as long as there is a **reasonable expectation of success**.

Using Wang's flow rate to oxidize Lin's nitrogen-treated polysilicon, oxide, and augmented N-O-Si is respectfully submitted to be a **new function**.

Further, Wang's oxidation is performed for a different purpose irrelevant to Lin's spacers 170. Indeed, Lin's silicon nitride 133 provides insulation ("enhanced intergate dielectric", see Abstract) between the floating and control gates 120, 150.

In contrast, Wang' silicon nitride 427 (Fig. 4F) is NOT used for insulation but is used for charge storage. See Wang's paragraph 4, last two lines ("...the charges stored in the silicon nitride layer will be lost..."). An exemplary use of silicon nitride for charge storage is described, for example, in U.S. patent no. 4,870,470 (Bass et al.), entitled "Non-Volatile Memory Cell Having Si Rich Silicon Nitride Charge Trapping Layer". (Of note, Bass prefers non-stoichiometric, silicon-rich silicon nitride for charge storage in an EEPROM memory cell.)

Since Wang's charge-storage silicon nitride is NOT used as an insulator, Wang needs a separate insulator -- silicon oxide layer 428 -- to stop charge leakage "from the silicon nitride layer to a polysilicon gate" 438 (Figs. 4F, 4G; paragraph 0004). Wang's ISSG flow rate is optimized for simultaneous "rapid oxidation" of his charge-storage silicon nitride layer (paragraph 0011) and silicon 402 to simultaneously form this oxide 428 as well as gate oxide 436 and buried drain/source oxide 434 (paragraph 0038). To assume that the same flow rate would form suitable spacers 170 on Lin's insulation silicon nitride 133 and nitrogen-treated polysilicon (120), oxide (143 and 135), and augmented N-O-Si (130), is respectfully submitted not to be supported by the office action's evidence or reasoning.

Any questions regarding this case can be addressed to the undersigned at the telephone number below.

If a fee is required for this submission, please charge the fee or any underpayment thereof, or credit any overpayment, to deposit account 08-1394.

Certificate of Transmission: I hereby certify that this correspondence is being transmitted to the United States Patent and Trademark Office (USPTO) via the USPTO's electronic filing system on November 12, 2010.

Signature: Michael Shenker
Date: Nov. 15, 2010

Respectfully submitted,

Michael Shenker

Michael Shenker
Patent Attorney
Reg. No. 34,250
Telephone: (408) 660-4157

Law Offices Of
Haynes and Boone, LLP